# Space & Missile Systems Center
# Detachment 12

SMC Detachment 12 – Space Test & Evaluation

# Mission Briefing

Detachment 12/CC
2 Dec 2004

# Mission Briefing Overview

- Detachment 12 Overview
- Rocket Systems Launch Program (Det 12/RP)
- DoD Space Test Program (Det 12/ST)
- R&D Space & Missile Operations (Det 12/VO)
- Recent Missions

# Detachment 12 Mission & Vision

- Mission
  - Detachment 12, Space and Missile Systems Center, serves as the primary provider of launch capability, space flight, and on-orbit operations demonstrating transformation technologies for the American warfighter

*Det 12 is assured access to space for the DoD RDT&E community*

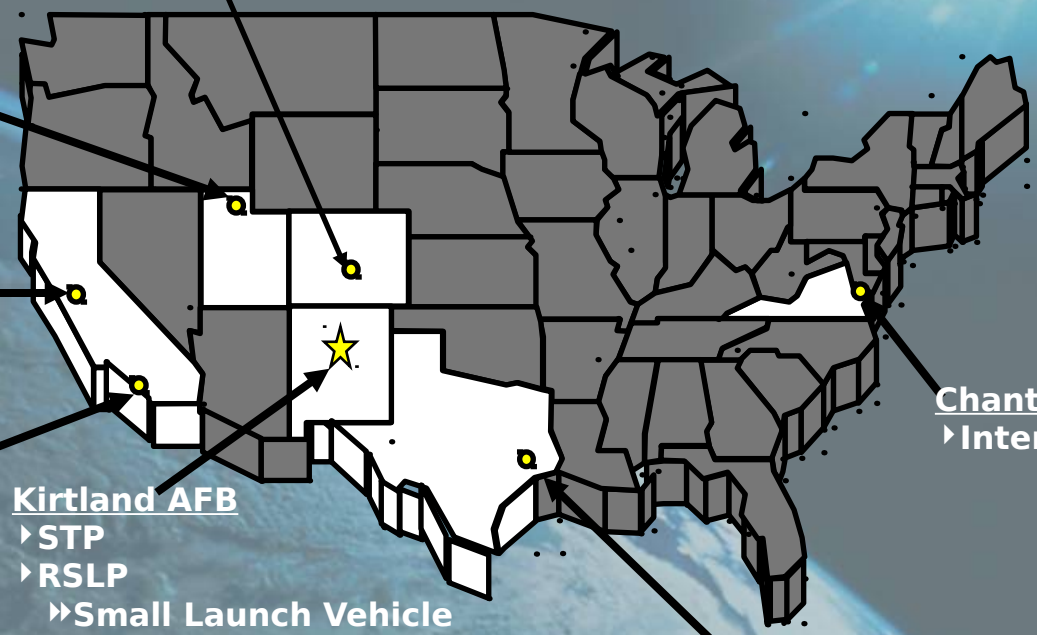
- Vision
  - Smart, dedicated, energetic team of aerospace and support professionals providing recognized world-class leadership in the design, acquisition, launch, and operation of one-of-a-kind space and missile missions for DoD.

*At Det 12, we don't make the payloads; we make the payloads fly*

# Detachment 12 Team

- Northrop Grumman Mission Systems
- Lockheed Martin Mission Systems
- Northrop Grumman Mission Systems
- Tecolote Engineering
- AT&T Government Solutions
- Jackson & Tull
- Aerospace Corporation
- Muniz Engineering, Inc.
- Electronic Documentation Systems, Inc.

# Detachment 12 Locations



**Schriever AFB**
- Center for Research Support (CERES) at the Joint National Integration Center

**Hill AFB**
- ICBM SPO Liaison

**Camp Parks Comm Annex**
- Fixed Antenna Site

**Los Angeles AFB**
- SMC Sys Acq Liaison
- SPO Test Support
- Reliance Staff Support

**Kirtland AFB**
- STP
- RSLP
  - Small Launch Vehicle
  - Missile Deactivation
  - Sub-orbital Launch
- RDSMO
  - RDT&E Support Complex
  - Deployable TT&C Systems
- Space-Based Laser (SBL) Program
- Space Single-Face-To-Customer (SFTC)
- T&E APDP Functional Manager

**Chantilly, VA**
- Inter-Range Ops

**NASA Johnson Space Center**
- Shuttle Experiment Planning & Integration
- ISS Experiment Planning & Integration

# Rocket Systems Launch Program

- Engineering Logistics
  - Store deactivated Minuteman (MM) assets
    - Soon to add Peacekeeper
  - Perform aging surveillance of existing ICBM assets
  - Refurbish MM motors/boosters
- Launch Program
  - Provide target vehicles for MDA programs
  - Execute sounding rocket and ICBM tests
  - Provide space lift for R&D programs
- Provides Treaty assistance

*Accomplishments:*
- 658 Launches
- 26 Booster Types
- 22 Launch Sites

# RSLP Charter

- Established in 1962
- SECDEF Charter in 1972
  - '…A Single Agency Providing Launch Vehicle Support for Three Services on a Cost Reimbursable Basis…'
- USAF Policy (Rocket Systems Launch Program PMD 2313)
  - RSLP will maintain active control and management of all Air Force deactivated ICBM missile assets
  - RSLP will provide flight test mission integration and support for national R&D requirements:  AF R&D, MDA, Army, Navy, NASA
- National Transportation Space Policy
  - "…consider use of excess ballistic missiles for space launch on a case-by-case basis, requires Secretary of Defense approval."

# RSLP Mission & Vision

- Mission
  - Manage deactivated ballistic missile assets and provide cost-effective launch services to the joint warfighter and other government agencies.

- Vision
  - To be the lead US Government agency responsible for all aspects of excess ballistic missile asset storage, refurbishment and reutilization, providing purpose cost-effective and highly reliable launch services for missile defense test and evaluation and space research and development programs.

# RSLP Core Competencies

- Engineering & Logistics
  - Store deactivated Minuteman & Peacekeeper assets
  - Perform aging surveillance on motor assets
  - Refurbish & certify motors/boosters for reuse
  - Peacekeeper deactivation
- Targets Program
  - Supports RDT&E of the ballistic missile defense system
    - Short/medium range targets
    - Long range targets
- Space Launch Program
  - Minuteman-derived space launch vehicle
  - Peacekeeper-derived space launch vehicle
- Weapon system development and evaluation

# RSLP Target Vehicles

## Short Range

Sounding Rockets

## Medium Range

TMD Class Targets

## Long Range

NMD Class Targets

# Minotaur Space Launch

| Minotaur Space Launch Vehicle | |
|---|---|
| Altitude | 100 – 1000 nmi |
| Inclination | 28.5$^{o}$ – 99$^{o}$ |
| Payload Weight | 700 – 1000 lbm |
| Customers | STP, AFRL, MDA |

## Launch Sites

Cape Canaveral AFS, FL
Vandenberg AFB, CA
NASA Wallops Island, VA
Kodiak Island, AK

# Minotaur IV Space Launch

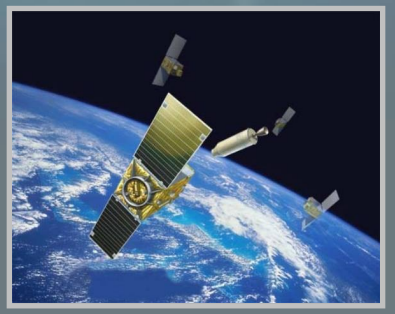
| Minotaur IV Space Launch Vehicle | |
|---|---|
| Altitude | 100 – 1000 nmi |
| Inclination | 28.5$^{o}$ – 99$^{o}$ |
| Payload Weight | 700 – 3500 lbm |
| Customers | SMC |

## Launch Sites

Cape Canaveral AFS, FL
Vandenberg AFB, CA
NASA Wallops Island, VA
Kodiak Island, AK

# DoD Space Test Program

- DoD program managed by USAF
- Spaceflight for DoD R&D technologies prioritized by the DoD Space Experiments Review Board (SERB)
- Specific Services Provided:
  - Mission planning and execution
  - Payload integration and test
  - Launch
  - One year of on-orbit operation
- Flight of small payloads on Expendable Launch Vehicles, Shuttle, and International Space Station (ISS)
- Services for reimbursable programs



*Average 9 Spaceflight Experiments Each Year!*

# Space Test Program Charter

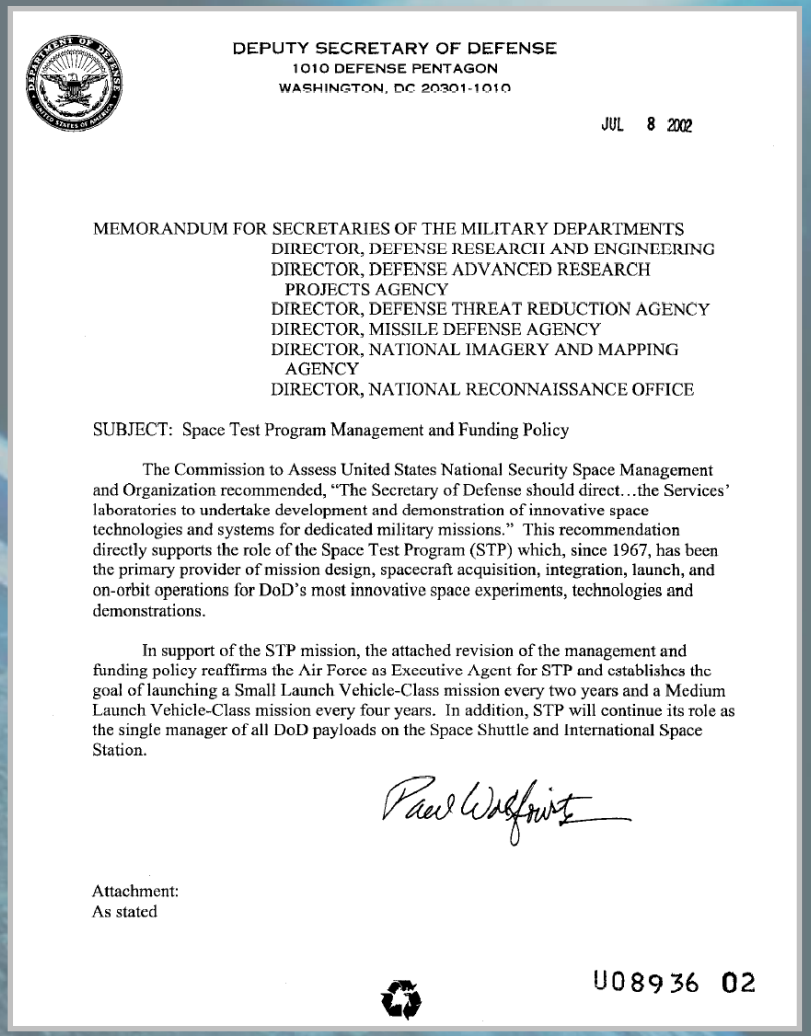
- Originally chartered by OSD in 1965
- Most recently revalidated by DepSecDef Wolfowitz in July 2002

STP is:

" . . . the primary provider of mission design, spacecraft acquisition, integration, launch, and on-orbit operations for DoD's most innovative space experiments, technologies and demonstrations."

*and*

"...the single manager of all DoD payloads on the Space Shuttle and International Space Station."



DEPUTY SECRETARY OF DEFENSE
1010 DEFENSE PENTAGON
WASHINGTON, DC 20301-1010

JUL 8 2002

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
DIRECTOR, DEFENSE RESEARCH AND ENGINEERING
DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS AGENCY
DIRECTOR, DEFENSE THREAT REDUCTION AGENCY
DIRECTOR, MISSILE DEFENSE AGENCY
DIRECTOR, NATIONAL IMAGERY AND MAPPING AGENCY
DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

SUBJECT: Space Test Program Management and Funding Policy

The Commission to Assess United States National Security Space Management and Organization recommended, "The Secretary of Defense should direct...the Services' laboratories to undertake development and demonstration of innovative space technologies and systems for dedicated military missions." This recommendation directly supports the role of the Space Test Program (STP) which, since 1967, has been the primary provider of mission design, spacecraft acquisition, integration, launch, and on-orbit operations for DoD's most innovative space experiments, technologies and demonstrations.

In support of the STP mission, the attached revision of the management and funding policy reaffirms the Air Force as Executive Agent for STP and establishes the goal of launching a Small Launch Vehicle-Class mission every two years and a Medium Launch Vehicle-Class mission every four years. In addition, STP will continue its role as the single manager of all DoD payloads on the Space Shuttle and International Space Station.

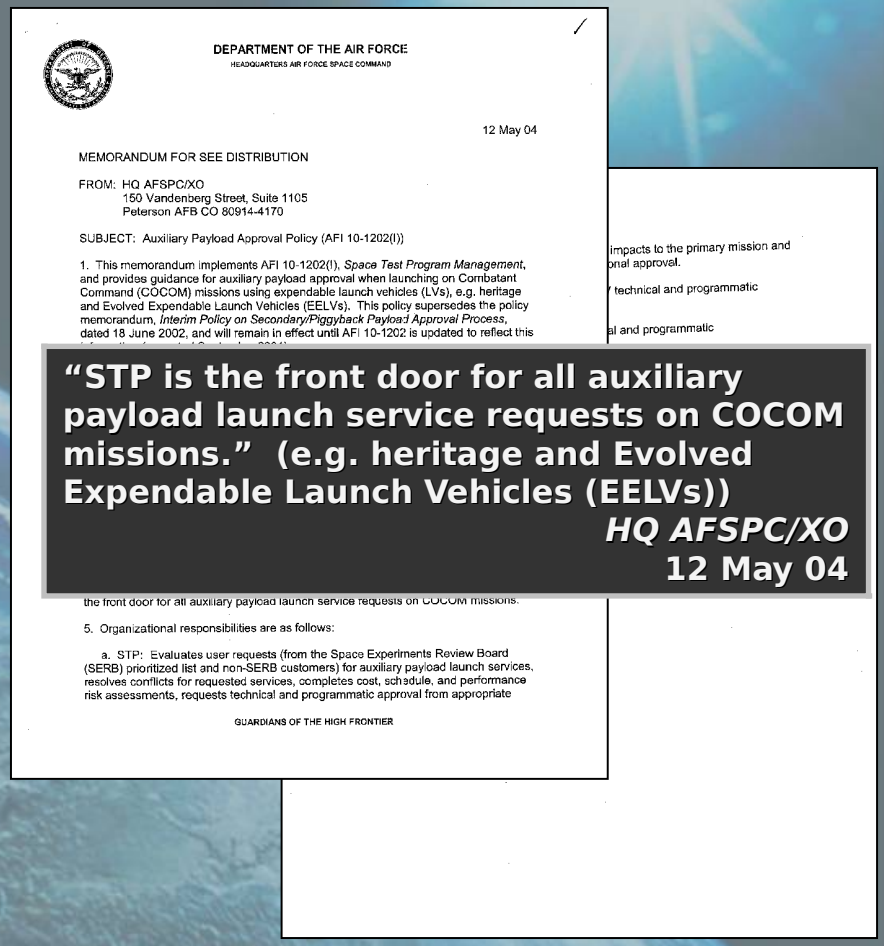
Paul Wolfowitz

Attachment:
As stated

U08936 02

# Launch Opportunities:
## DoD Auxiliary Payload Policy

- AFSPC policy establishes STP as the "front door" for all auxiliary payloads on EELV and heritage launch vehicles
  - May 2004
- HQ AFSPC, SMC's EELV Program Office and DoD STP have developed an Auxiliary Payload Implementation plan for EELV missions
  - July 2004



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE SPACE COMMAND

12 May 04

MEMORANDUM FOR SEE DISTRIBUTION

FROM: HQ AFSPC/XO
150 Vandenberg Street, Suite 1105
Peterson AFB CO 80914-4170

SUBJECT: Auxiliary Payload Approval Policy (AFI 10-1202(I))

1. This memorandum implements AFI 10-1202(I), *Space Test Program Management*, and provides guidance for auxiliary payload approval when launching on Combatant Command (COCOM) missions using expendable launch vehicles (LVs), e.g. heritage and Evolved Expendable Launch Vehicles (EELVs). This policy supersedes the policy memorandum, *Interim Policy on Secondary/Piggyback Payload Approval Process*, dated 18 June 2002, and will remain in effect until AFI 10-1202 is updated to reflect this

**"STP is the front door for all auxiliary payload launch service requests on COCOM missions." (e.g. heritage and Evolved Expendable Launch Vehicles (EELVs))**
***HQ AFSPC/XO***
**12 May 04**

the front door for all auxiliary payload launch service requests on COCOM missions.

5. Organizational responsibilities are as follows:

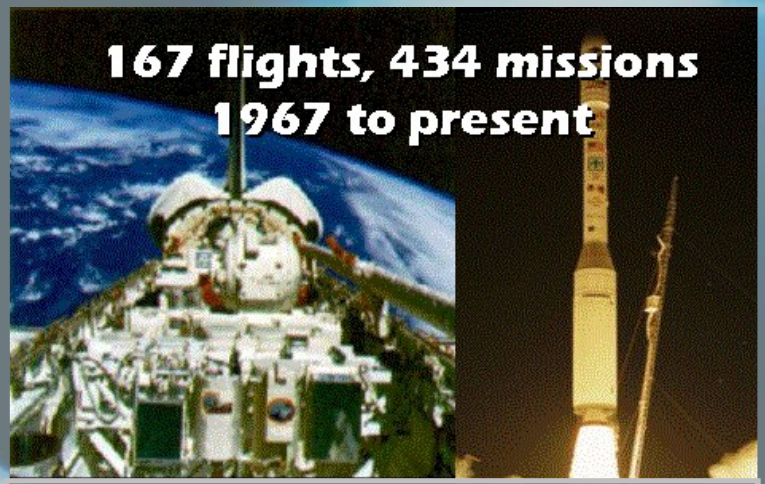
a. STP: Evaluates user requests (from the Space Experiments Review Board (SERB) prioritized list and non-SERB customers) for auxiliary payload launch services, resolves conflicts for requested services, completes cost, schedule, and performance risk assessments, requests technical and programmatic approval from appropriate

GUARDIANS OF THE HIGH FRONTIER

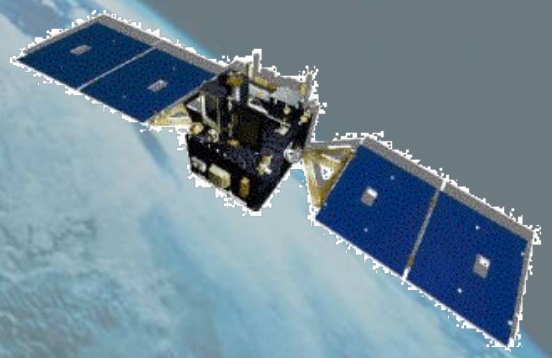
impacts to the primary mission and
onal approval.
technical and programmatic
al and programmatic

# STP Core Competencies

- Broad and deep expertise in:
  - Mission Design
  - Spacecraft bus acquisition
  - Payload integration & test
  - Launch
  - On-orbit operations
- STP can provide everything for spaceflight except the sensor/experiment
  - Can fund SERB-ranked payloads, or
  - Provide services on a cost reimbursable basis

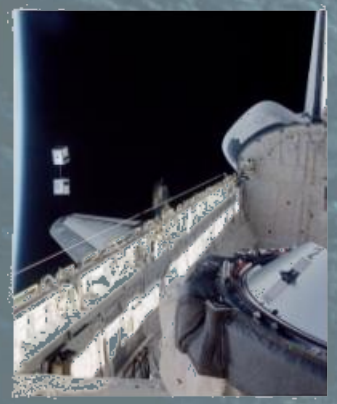



STP "intellectual capital" gives customers extensive capabilities



# STP Spaceflight Definitions

- Shuttle/ISS
  - Deployable, payload bay, mid-deck lockers, ISS internal/external
- Auxiliaries
  - Piggyback: payloads that leverage margin on an existing spacecraft
  - Secondary: spacecraft that leverage margin on an existing launch vehicle
- Dedicated Launches
  - Spacecraft that are launched by a dedicated launch vehicle



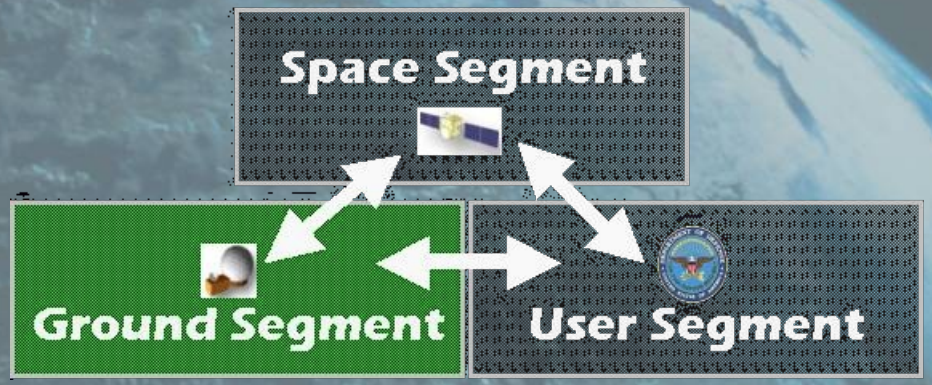
# R&D Space & Missile Operations

- Prepare for and conduct on-orbit operations of USAF, DoD, and other R&D and post-operational satellites
  - STP, AFRL, NRL, DoE, et al
  - DSP, DSCS, et al
- Provide a space operations testbed for rapid prototyping, test and evaluation, and system activation
- Provide worldwide access to space assets where fixed sites do not exist
  - Factory and launch base compatibility testing
  - Booster and on-orbit satellite support

*31 Spacecraft or Booster Missions in Planning, Readiness or Ops!*

# RDSMO Vision

- Test and support space systems as a comprehensive RDT&E ground segment center of excellence
- Based on PMD [9267(9), 19 Sept 01]
  - “Act as the research, development, and test operations agent for assigned DoD experimental/demonstration satellites, missiles, and/or launch boosters, satellite ground control systems, tracking systems, and commercial applications of these systems.”



# RDSMO Core Competencies

# Camp Parks Communication Annex: VOA

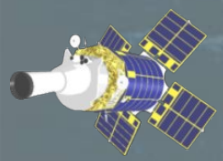
## FIXED ANTENNA SITE

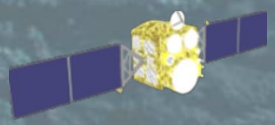
- 11.75 acre site on 11K acre range
- Range of Frequencies/Data Rates
  - SGLS, UHF
  - X-band, L-band
- Supports On-Orbit
  - Calibration
  - Testing
  - Anomaly Resolution
  - Routine Operations
  - Data Capture & Telemetry
- AFSCN Connectivity thru OSR/WAN

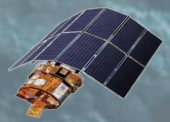
# Center for Research Support (CERES): VO

## SPACE OPERATIONS CENTER

- Over 5,000 sq ft of floor space
- Testbed for Rapid Capability
  - Prototype
  - Evaluate
  - Activate
- Access to Ground/Space Assets
- Residual Satellite Operations
- Ground System Control
- D
- Additional ources
  - CAPSULE Research Lab
  - Multi-Mission SOC


DSP


DSCS III


TSX-5

DMS P

DSCS II

GPS

# CERES

- 3 Operational Strings for Residual Operations and Program Support (ISAS, CANE, CRSS)
- Full AFSCN Access (SAFB / OAFS)
- 24/7 Contractor Operations
- Interoperability between Systems
- Tactics, Techniques & Procedures Development & Validation
  - Test & Evaluation/Concept Demo

# Deployable Test Systems

## Deployable Antenna Unit

- Worldwide TT&C Relay Support
  - Land- or Sea-based
- Range of Frequencies/Data Rates
  - SGLS, USB
- Supports Critical Events
  - Launch & Stage Separations
  - Satellite Factory Compatibility
  - Anomalies

# RDT&E Support Complex

## Satellite Operations Center

- Manages and Supports RDT&E missions from inception through end of life
- Mission planning: orbit dynamics, scheduling, command generation
- Mission data archival & distribution
- Satellite TT&C
  - Telemetry processing, analysis, display, trending

# Space Capabilities CONOPS

## Operational System

- $100M - $1B
- Traditional SPO

## Warfighter Needs

- Technology Needs
- System Deficiencies
- Doctrine

## Test & Evaluation

- $100k - $10M
- CONOPS
- Techniques

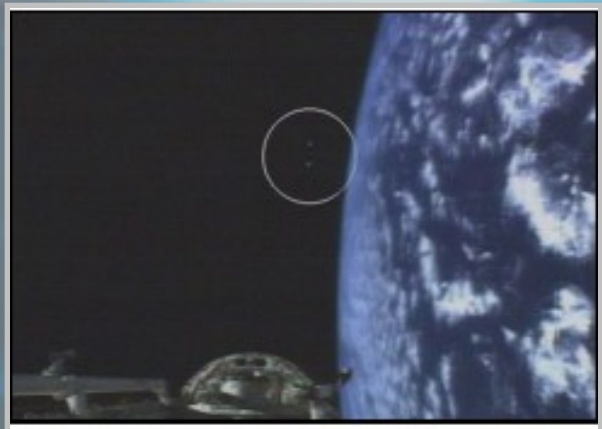
## Technology Development

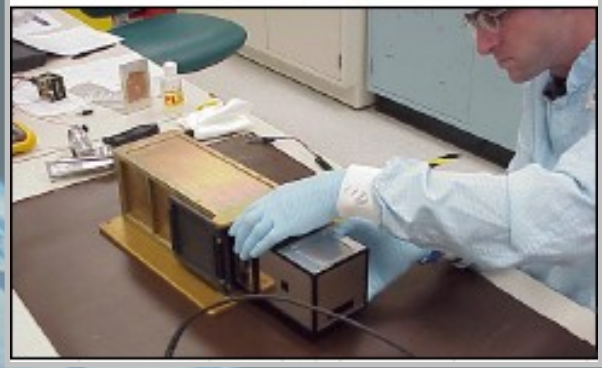
- NRL
- AFRL
- MDA
- DARPA

*Det 12 does the “hands-on” demonstration of transformation*

Recent Missions

# MEPSI (STS-113)

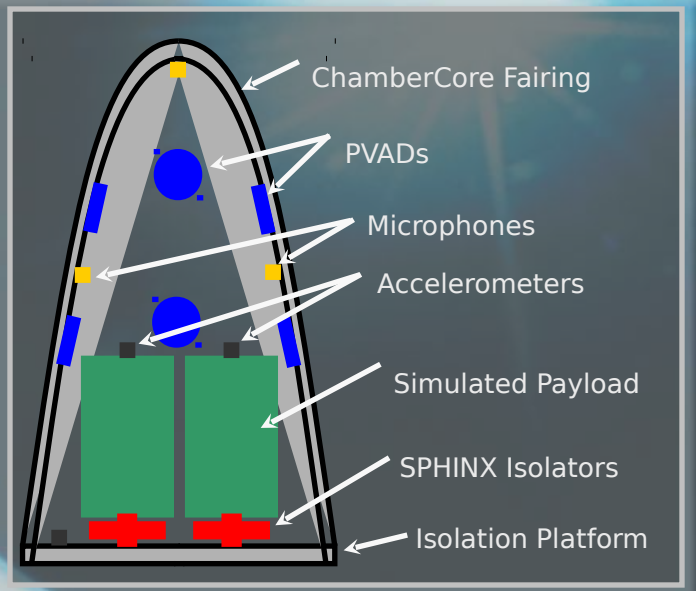




- Micro-electro-mechanical (MEMS) Based Pico-Satellite Inspector
- Flown successfully in December 2002

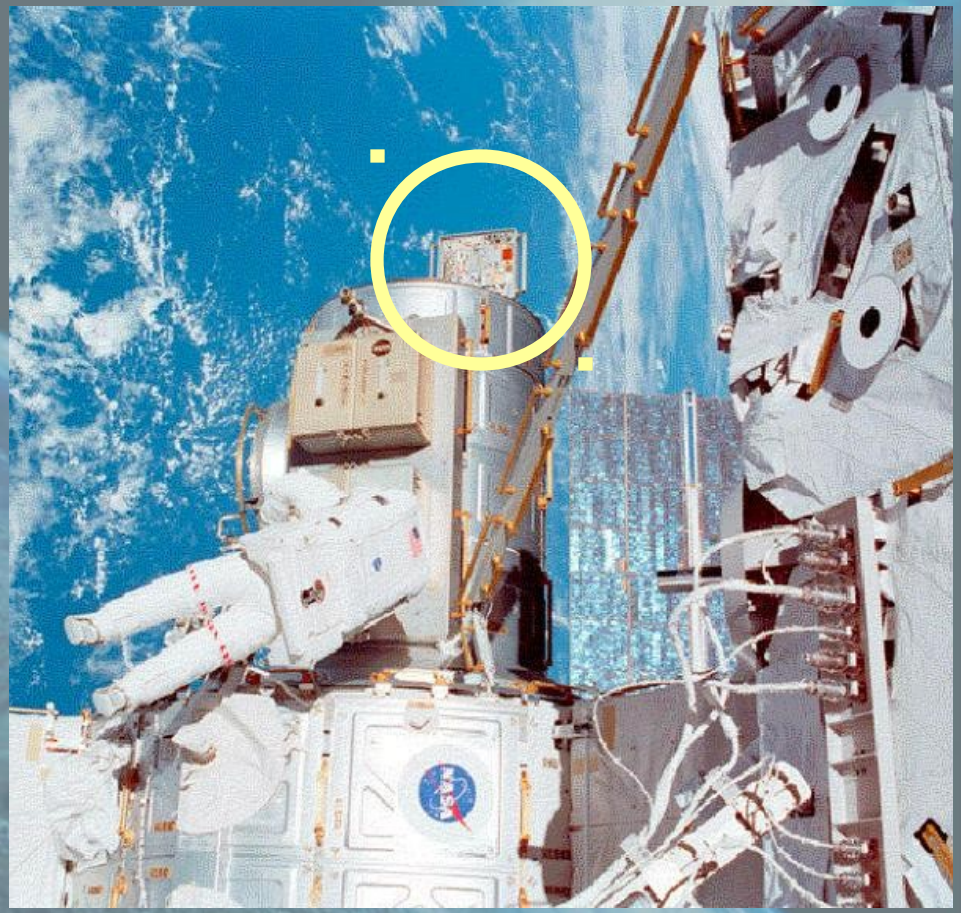
# VALPE (S02-2)

- Vibro-Acoustic Launch Protection Experiment
- Objective: To provide proof-of-concept demonstration of multiple technologies on a sub-scale mission (size & cost)
  - Vibration Isolation & Control
    - Active – CSA & Boeing
    - Passive – CSA
    - Regenerative Electronics – Boeing
  - Acoustic Mitigation & Advanced Structures
    - ChamberCore – Delta Velocity
    - PVAD – AFRL/Boeing
- Successful launch on Aug 2003



# MISSE (ISS)

- Materials on the ISS Experiment
  - Test materials' exposure to space environment
  - Photos show regular degradation
- Launched in 2001
- Awaiting Shuttle Return-To-Flight (RTF) for MISSE return

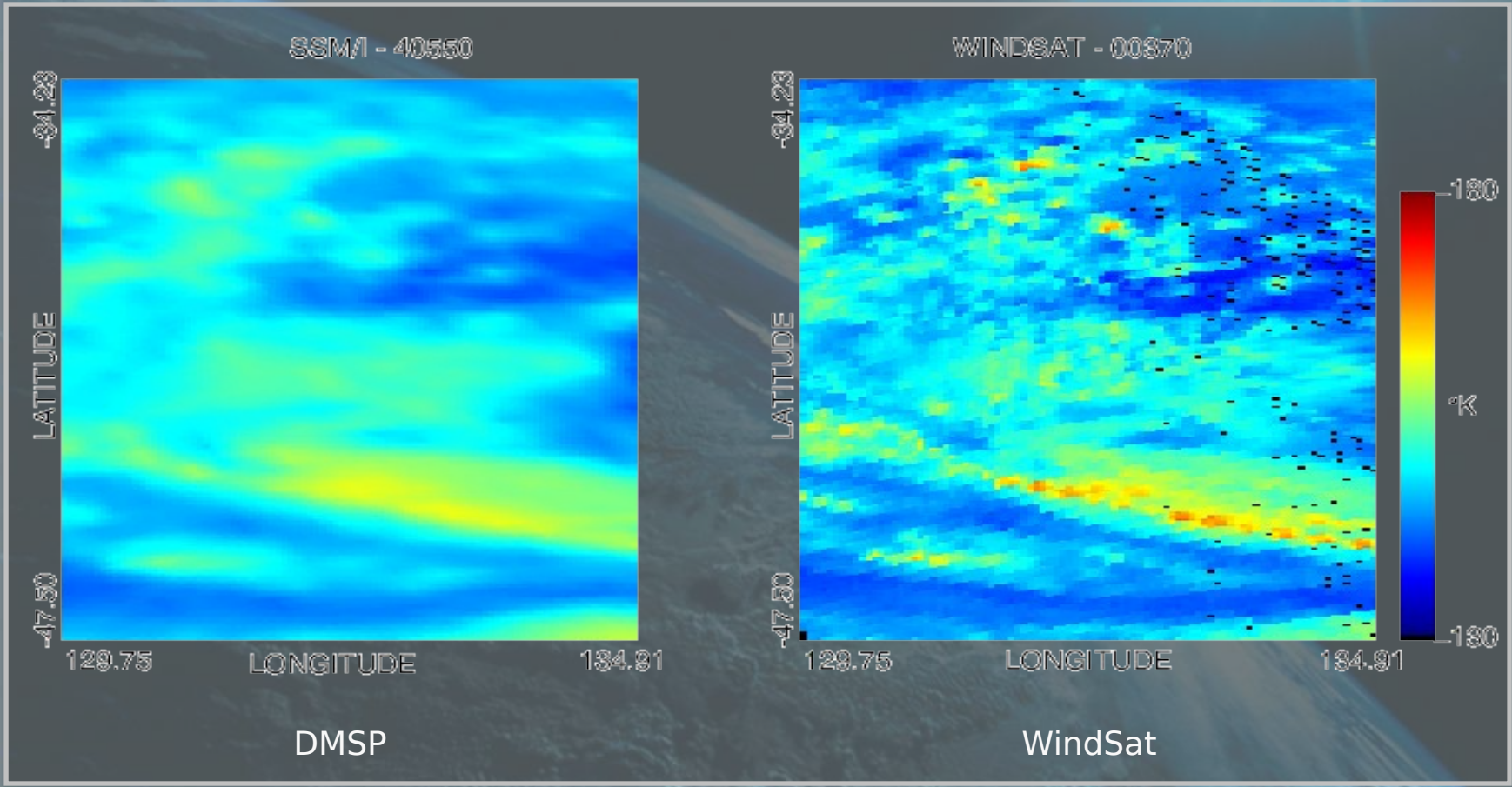


# Coriolis

- WINDSAT (NRL)
  - Passive microwave polarimeter for ocean wind remote sensing
  - Wind speed & direction at ocean surface. Risk reduction for NPOESS Conical Microwave Imaging Sounder
- Solar Mass Ejection Imager (AFRL)
  - 2-3 day warning of geomagnetic storms which impact satellite communications & navigation
- Launched: Titan II, 6 Jan 03
- $223.5M mission

# Coriolis Initial Data

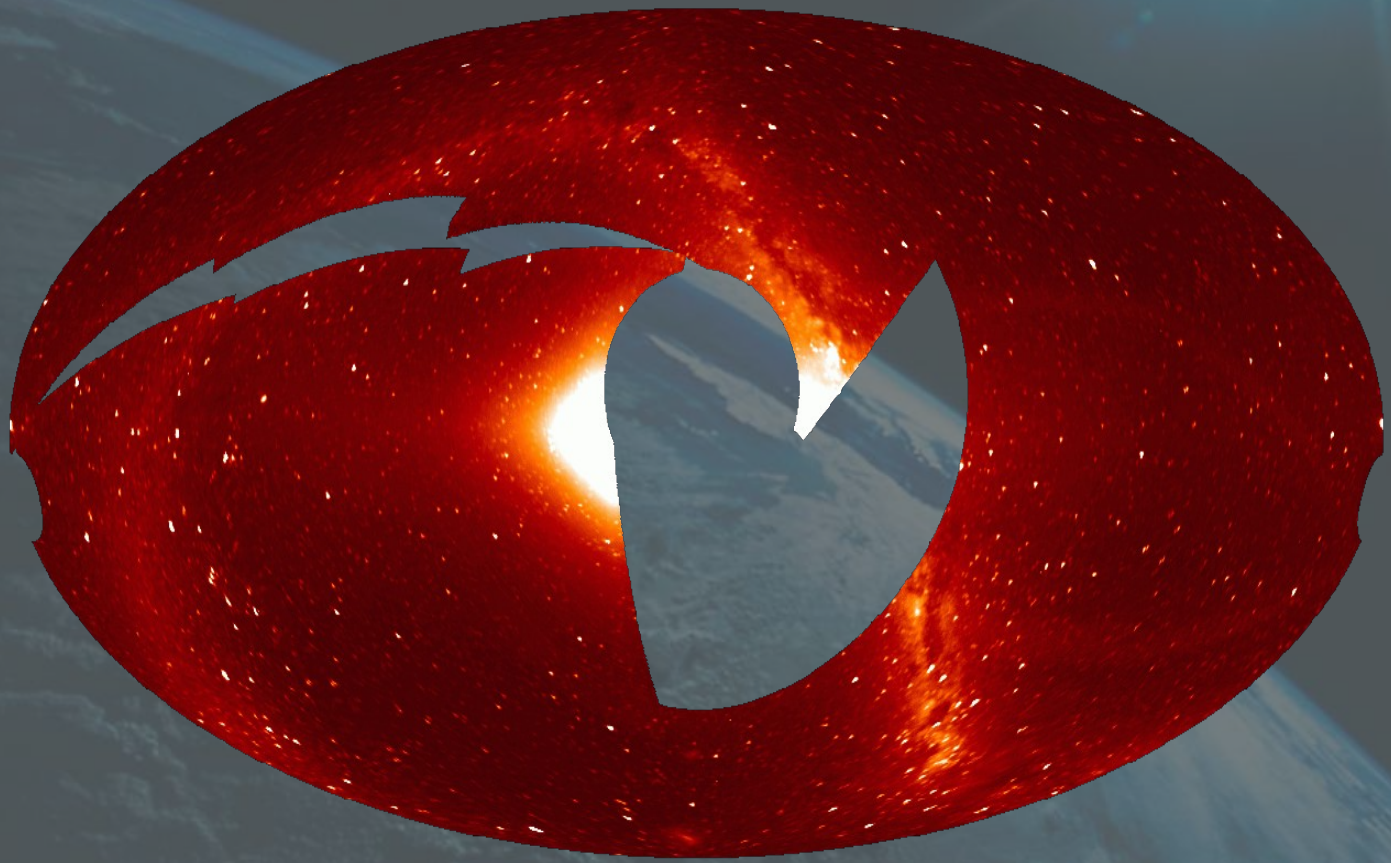
- Preliminary data shows WindSat resolution is higher than DMSP




DMSP WindSat

# Coriolis Initial Data

- Solar Mass Ejection Imager (SMEI) 3-Camera Composite
- All-Sky Aitoff Projection (February 2003)



# XSS-10

- Experimental Satellite System – 10
- Demonstrated autonomous micro-satellite proximity operations